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## Formation and properties of ternary silicide ( $\text{Co}_x\text{Ni}_{1-x}$ )Si thin films

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*This paper appears in: Solid-State and Integrated Circuit Technology, 1998. Proceedings. 1998 5th International Conference on*

Meeting Date: 10/21/1998 - 10/23/1998

Publication Date: 21-23 Oct. 1998

Location: Beijing China

On page(s): 271 - 274

Reference Cited: 6

Number of Pages: xxi+973

Inspec Accession Number: 6319144

### Abstract:

A ternary silicide ( $\text{Co}_x\text{Ni}_{1-x}$ )Si<sub>2</sub> formed by Ni and Co thin films or Ni, Co and Ti thin film deposited on a Si(100) substrate is studied. The results show that a highly conductive silicide ( $\text{Co}_x\text{Ni}_{1-x}$ )Si<sub>2</sub> can be formed by solid phase reaction of either Ni/Co/Si or Co/N structures. The resistivity of the silicide films is in the range of (15-20)  $\mu\Omega\cdot\text{cm}$ . The formation temperature of ( $\text{Co}_x\text{Ni}_{1-x}$ )Si<sub>2</sub> is rather low compared with the disilicides of Co and Ni. XRD data show that ( $\text{Co}_x\text{Ni}_{1-x}$ )Si<sub>2</sub> has a CaF<sub>2</sub> structure and its lattice constant between that of CoSi<sub>2</sub> and NiSi<sub>2</sub>. ( $\text{Co}_x\text{Ni}_{1-x}$ )Si<sub>2</sub> can also be formed by rapid thermal annealing of a Co/Ni/Ti/Si multilayer structure. A quite low  $x_{\min}$  value is shown by RBS/channeling investigation. The joint has a better epitaxy quality as compared with that without a Ti interlayer. It is more uniform and has a good thermal stability and low resistivity. Experiments with two step annealing and chemical selective etching demonstrate that a self-aligned silicided contact and a gate-level interconnection structure can be formed on Si wafers.

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